

an insulator layer having windows, wherein the insulator layer is formed on a portion of the upper electrodes; and a conductor pattern connecting with the upper electrodes through the windows of the insulator layer.

5      2. The ink-jet recording head according to claim 1, wherein the conductor pattern is formed on a lateral side of the upper electrode between the pressure generating chambers and connected to said upper electrode at more than one site through the windows.

10     3. The ink-jet recording head according to claim 1, wherein the windows extend to a peripheral edge of each of the piezoelectric layers such that the windows do not interfere with the displacement of the vibrating region of the piezoelectric layer.

15     4. The ink-jet recording head according to claim 1, wherein the insulator layer is made of either one of a silicon oxide, a silicon nitride and an organic material.

20     5. The ink-jet recording head according to claim 4, wherein the insulator layer is made of a polyimide.

25     6. An ink-jet recording head according to claim 1, wherein the insulator layer is formed of an etchant resistant film which is used as a protective film at etching.

30     7. An ink jet recording head comprising:

25     an elastic sheet facing pressure generating chambers; nozzle orifices communicating with the pressure generating chambers;

30     piezoelectric vibrators formed on the elastic sheet, each of the piezoelectric vibrators having, a lower electrode formed on the elastic sheet, a piezoelectric layer formed on the lower electrode, and an upper electrode formed on the piezoelectric layer such that the upper electrode faces the respective pressure generating chamber, wherein the piezoelectric layer and the upper electrode are formed entirely inside of areas facing the respective pressure generating chamber;

35     40    an insulator layer having windows, wherein the insulator layer is formed on a portion of the upper electrodes; and a conductor pattern connecting with the upper electrodes through the windows of the insulator layer.

40     8. The ink-jet recording head according to claim 7, wherein the conductor pattern is formed on a lateral side of the upper electrode between the pressure generating chambers and connected to said upper electrode at more than one site through the windows.

45     9. The ink-jet recording head according to claim 7, wherein the windows extend to a peripheral edge of each of the piezoelectric layers such that the windows do not interfere with the displacement of the vibrating region of the piezoelectric layer.

50     10. The ink-jet recording head according to claim 7, wherein the insulator layer is made of either one of a silicon oxide, a silicon nitride and an organic material.

55     11. The ink-jet recording head according to claim 10, wherein the insulator layer is made of a polyimide.

60     12. An ink-jet recording head according to claim 7, wherein the insulator layer is formed of an etchant resistant film which is used as a protective film at etching.

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--13. A method of forming an ink jet recording head, comprising an elastic sheet facing pressure generating chambers, nozzle orifices communicating with the pressure generating chambers, and piezoelectric vibrators formed on the elastic sheet by a film deposition technique, said method comprising:

forming a lower electrode on the elastic sheet;

defining a first area in a longitudinal direction of each of the pressure generating chambers;

defining a second area in a width direction of each of the pressure generating chambers;

forming a piezoelectric layer on the lower electrode, and within one of said first area and said second area; and

forming an upper electrode on the piezoelectric layer.

14. A method of forming the ink jet recording head of claim 13, wherein the piezoelectric layer is formed in each of the pressure generating chambers.

15. A method of forming the ink jet recording head of claim 13, wherein the upper electrode is formed in a substantially same shape as the piezoelectric layer.

16. A method of forming an ink jet recording head, comprising an elastic sheet facing pressure generating chambers, nozzle orifices communicating with the pressure generating chambers, and piezoelectric vibrators formed on the elastic sheet, said method comprising:

forming a lower electrode on the elastic sheet;

forming a piezoelectric layer on the lower electrode;

forming an upper electrode on the piezoelectric layer such  
that the upper electrode faces a respective pressure generating  
chamber, wherein the upper electrodes of the piezoelectric  
vibrators are positioned independently of each other;

forming, on a portion of the upper electrodes, an insulator  
layer having windows; and

forming a conductor pattern connecting with the upper  
electrodes through the windows of the insulator layer.

17. A method of forming the ink-jet recording head  
according to claim 16, wherein the conductor pattern is formed on  
a lateral side of the upper electrode between the pressure  
generating chambers and connected to said upper electrode at more  
than one site through the windows.

18. A method of forming the ink-jet recording head  
according to claim 16, wherein the windows extend to a peripheral  
edge of each of the piezoelectric layers such that the windows do  
not interfere with the displacement of the vibrating region of the  
piezoelectric layer.

19. A method of forming the ink-jet recording head  
according to claim 16, wherein the insulator layer is made of either  
one of a silicon oxide, a silicon nitride and an organic material.

20. A method of forming the ink-jet recording head according to claim 19, wherein the insulator is made of polyimide.

21. A method of forming the ink-jet recording head according to claim 16, wherein the insulator layer is formed of an etchant resistant film which is used as a protective film at etching.

22. A method of forming an ink jet recording head, comprising an elastic sheet facing pressure generating chambers, nozzle orifices communicating with the pressure generating chambers, and piezoelectric vibrators formed on the elastic sheet, said method comprising:

forming a lower electrode on the elastic sheet;

forming a piezoelectric layer on the lower electrode;

forming an upper electrode on the piezoelectric layer such that the upper electrode faces the respective pressure generating chamber, wherein the piezoelectric layer and the upper electrode are formed entirely inside of areas facing the respective pressure generating chamber;

forming, on a portion of the upper electrodes, an insulator layer having windows; and

forming a conductor pattern connecting with the upper electrodes through the windows of the insulator layer.

23. A method of forming the ink-jet recording head according to claim 22, wherein the conductor pattern is formed on a lateral side of the upper electrode between the pressure

generating chambers and connected to said upper electrode at more than one site through the windows.

24. A method of forming the ink-jet recording head according to claim 22, wherein the windows extend to a peripheral edge of each of the piezoelectric layers such that the windows do not interfere with the displacement of the vibrating region of the piezoelectric layer.

25. A method of forming the ink-jet recording head according to claim 22, wherein the insulator layer is made of either one of a silicon oxide, a silicon nitride and an organic material.

26. A method of forming the ink-jet recording head according to claim 25, wherein the insulator is made of polyimide.

27. A method of forming the ink-jet recording head according to claim 22, wherein the insulator layer is formed of an etchant resistant film which is used as a protective film at etching.

28. A method of forming the ink jet recording head according to claim 13, said method further comprising:

forming, on a portion of the upper electrodes, an insulator layer having windows; and

forming a conductor pattern connecting with the upper electrodes through the windows of the insulator layer.

29. A method of forming the ink-jet recording head according to claim 28, wherein the conductor pattern is formed on a lateral side of the upper electrode between the pressure generating chambers and connected to said upper electrode at more than one site through the windows.

30. A method of forming the ink-jet recording head according to claim 28, wherein the windows extend to a peripheral edge of each of the piezoelectric layers such that the windows do not interfere with the displacement of the vibrating region of the piezoelectric layer.

31. A method of forming the ink-jet recording head according to claim 28, wherein the insulator layer is made of either one of a silicon oxide, a silicon nitride and an organic material.

32. A method of forming the ink-jet recording head according to claim 31, wherein the insulator is made of polyimide.

33. A method of forming the ink-jet recording head according to claim 16, wherein the insulator layer is formed of an etchant resistant film which is used as a protective film at etching.

34. A method of forming the ink jet recording head according to claim 13, said method further comprising:

forming, on a portion of the upper electrodes, an insulator layer having windows; and

forming a conductor pattern connecting with the upper electrodes through the windows of the insulator layer,

wherein the piezoelectric layer and the upper electrode are formed entirely inside of areas facing the respective pressure generating chamber.

35. A method of forming the ink-jet recording head according to claim 34, wherein the conductor pattern is formed on a lateral side of the upper electrode between the pressure generating chambers and connected to said upper electrode at more than one site through the windows.

36. A method of forming the ink-jet recording head according to claim 34, wherein the windows extend to a peripheral edge of each of the piezoelectric layers such that the windows do not interfere with the displacement of the vibrating region of the piezoelectric layer.

37. A method of forming the ink-jet recording head according to claim 34, wherein the insulator layer is made of either one of a silicon oxide, a silicon nitride and an organic material.

38. A method of forming the ink-jet recording head according to claim 37, wherein the insulator is made of polyimide.

39. A method of forming the ink-jet recording head according to claim 34, wherein the insulator layer is formed of an etchant resistant film which is used as a protective film at etching.--